IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

NON-PROVISIONAL PATENT APPLICATION

Title: A LIFTING ARRANGEMENT FOR AIRCRAFT FUSELAGES

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CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of priority dates of Spanish Patents No. P960104 filed on September 6, 1996; No. P9707753 filed on August 7, 1997; No. P9902785 filed on December 20, 1999; and No. P9902646 filed on December 1, 1999. The basis for priority in this case is the Paris Convention for the Protection of Industrial Property (613 O.G. 23,53 Stat 1748). The Spanish patent applications were filed in The Official Patent and Trademarks Office of Spain.

DESCRIPTION OF THE INVENTION

A lifting arrangement for aircraft fuselage including placing longitudinal vertical or slanted fins or plates on the lower and lateral lower part of the whole fuselage, further including the nose and tail, thus avoiding the lateral slip of the airflow that presses on the underside of the fuselage when it advances with a certain angle of

positive attack, resulting in the production of strong lift. The fins form large channels with the underside of the fuselage, and are open on their lower area.

Also, longitudinal horizontal or laterally slanted fins can be added on the lateral middle or middle-to-low area of the fuselage with a slight sloping up on the nose in order to increase the lift, particularly at low speeds. Upon increasing the angle of attack, the lift produced is such that, in addition to the wings, the flaps can be eliminated. The fins can be slanted or turned laterally, and are arranged in such a way that the upper fins are projected increasingly laterally. This arrangement, and their positive slope up to the nose, direct the air flow backward and downward, thereby producing complementary lift.

At either cruising speed or high speed, a small angle of attack of the fuselage is sufficient in order to produce either completely or partially the lift generated by the wings.

The fins or plates can be flat or curved around an axis approximately parallel to the longitudinal axis of the fuselage, that is, with the convexity towards the exterior. This curvature reduces the impact of the lateral wind.

The fins, although generally fixed, are capable of rotation or retraction in order to reduce friction.

The lower surface of the fuselage can be flat or shaped in a circular or elliptical arc cross-section, with the preferable embodiment having a flat lower surface.

The upper surface of the fuselage can be flat, although preferably it will be shaped in a circular or elliptical arc cross-section.

The lateral surfaces of the fuselage can be curved or flat in cross-section.

Elongated fuselages with the following shapes or constant cross-sections may be implemented: circular, semicircular with flat lateral walls, oval, circular segment, oval segment or rectangular with rounded sides, and mainly narrowed or flattened vertically.

The vertically flattened fuselages are less affected by side winds.

The fuselage may generally have a sloped nose and tail, illustrated in figure 1. The upper forward and rear areas will preferably be aerodynamically curved, profiled or streamlined. This is the only aircraft where the nose, fuselage and tail produce the whole lift.

The fins can be added to current conventional fuselages in order to obtain the benefit of added lift, without the need for making major changes, and their lower fins can have a positive-angled slope.

The area of the fuselage between the nose and the tail can have a thickness widening from a lesser to greater degree towards the rear, in such a way that at cruising speed, when the lower surface forms a certain positive angle with the horizontal, the upper side will be completely horizontal, thus avoiding or delaying the separation of the boundary layer.

The fuselage may be slightly curved lengthwise with its underside concave.

The main landing gear may be displaced backward.

Small thin wings, stabilizing fins or a large conventional stabilizer, which do not produce lift, are only necessary to provide complementary lift.

The total drag to forward movement is much lower than that of conventional aircraft with wings.

The advantages of the current invention include the generation of strong lift, with the possibility of eliminating the flaps and the wings completely. The aircraft accelerates quicker during take-off resulting from the elimination of flap use Further, the major lift will come about during rotation, for which reason the runway length required will be much shorter. The current invention also would weigh less or can carry a heavier payload. The current invention is simpler, more economical, has a lower total

drag, and is useful for all fuselages as the lift is produced by the whole underside of the aircraft.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a schematic lateral view of one of the fuselages in the invention with the longitudinal fins or plates on its lateral lower part.

Figure 2 shows a schematic lateral view of a current fuselage with the longitudinal fins in the invention.

Figure 3 shows a schematic cross-sectional view of a variant of a fuselage and its fins.

Figure 4 shows a schematic cross-sectional view of a variant of a fuselage and its fins.

Figure 5 shows a schematic cross-sectional view of a variant of a fuselage and its fins.

Figure 6 shows a schematic cross-sectional view of a variant of a fuselage and its fins.

Figure 7 shows a schematic cross-sectional view of a variant of a fuselage and its fins.

Figure 8 shows a schematic cross-sectional view of a variant of a fuselage and its fins.

Figure 9 shows a schematic cross-sectional view of a variant of a fuselage and its fins.

MORE DETAILED DESCRIPTION OF THE DRAWINGS

Figure 1 shows the upper surface of the fuselage (1), the longitudinal fins on the lateral lower part of the nose (2), the underside of the fuselage (3), and the longitudinal fins or plates on the lower and lateral lower part of the fuselage (4). The streamlines flow and arrows show the downward displacement of the airflow and as a result the forces generated on the fuselage. The nose lift force (LN) and its drag (DN), the lift of the underside of the fuselage (LF) and its drag (DF), and the tail lift force (LT) and its drag (DT).

Figure 2 shows the upper zone or surface of a conventional fuselage (1), the underside of the fuselage (3) and the longitudinal fins on the lateral lower part of the fuselage (4).

Figure 3 shows the upper zone or surface of a fuselage of semicircular cross-section (1) using flat lateral walls, the underside of the fuselage (3) and the longitudinal flat fins on the lower and lateral lower part of the fuselage (4), with said fins forming large channels with the underside of the fuselage and open on their lower area.

Figure 4 shows the upper zone or surface of a fuselage of circular segment cross-section (1), the underside of the fuselage (3) and the longitudinal curved fins on the lateral

lower part of the fuselage (4), with the upper fins projected increasingly laterally.

Figure 5 shows the upper zone or surface of a fuselage of circular cross-section (1), the underside of the fuselage (3), the longitudinal flat fins on the lateral lower part of the fuselage (4), the longitudinal horizontal or laterally slanted fins (6 and 7) added on the lateral middle or middle-to-low area of the fuselage with a slight positive slope up to the nose, including fins which can be slanted or turned laterally.

Figure 6 shows the upper zone or surface of an oval segment cross-section fuselage (1), the underside of the fuselage (3) and the longitudinal curved fins on the lateral lower part of the fuselage (4).

Figure 7 shows the upper zone or surface of an oval and flattened cross-section fuselage (1), the underside of the fuselage (3) and the longitudinal flat fins on the lateral lower part of the fuselage (4).

Figure 8 shows the upper zone or surface of a fuselage (1) whose cross-section is rectangular with rounded sides, the underside of the fuselage (3) and the longitudinal fins on the lateral lower part of the fuselage (4).

Figure 9 shows the upper zone or surface of a fuselage (1), the longitudinal fins on the lateral lower part of the fuselage (4), and the rams (5) that act the fins.